

**FINAL
WORK PLAN
HYDRAULIC CONTROL PILOT PROJECT
OPERABLE UNIT 1
FRITZSCHE ARMY AIRFIELD FIRE DRILL AREA
FORMER FORT ORD, CALIFORNIA**

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AHTNA	AHTNA Government Services Corporation
ACL	aquifer cleanup level
ARAR	applicable or relevant and appropriate requirement
BCT	BRAC Cleanup Team
bgs	below ground surface
BRAC	Base Realignment and Closure
COC	contaminant of concern
CSM	conceptual site model
CT	carbon tetrachloride
DCA	dichloroethane
DCE	dichloroethene
DENR	Directorate of Environmental and Natural Resources
EM	environmental monitor
FDA	Fire Drill Area
FONR	Fort Ord Natural Reserve
ft/d	feet per day
GAC	granular activated carbon
gpm	gallons per minute
GWETS	groundwater extraction and treatment system
HCPP	Hydraulic Control Pilot Project
HGL	HydroGeoLogic, Inc.
HMP	Habitat Management Plan
HSA	hollow-stem auger
IDW	investigation-derived waste
K	hydraulic conductivity
LBNL	Lawrence Berkeley National Laboratory
LLNL	Lawrence Livermore National Laboratory
LTM	long-term monitoring
MACTEC	MACTEC Engineering and Consulting, Inc.
MCL	maximum contaminant level

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS (Continued)

MEK	methyl ethyl ketone
msl	mean sea level
ND	non-detect
NTU	nephelometric turbidity unit
OD	outside diameter
OU	operable unit
O&M	operation and maintenance
PCE	tetrachloroethene
PDB	passive diffusion bag
PEST	Parameter Estimation Software Tool
PG&E	Pacific Gas and Electric
ppb	parts per billion
PVC	polyvinyl chloride
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SVA	Salinas Valley Aquiclude
TCE	trichloroethene
UCSC	University of California at Santa Cruz
UCNRS	University of California Natural Reserve System
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	volatile organic compound
Work Plan	Hydraulic Control Project Plan

EXECUTIVE SUMMARY

HydroGeoLogic, Inc. (HGL) is executing a remediation project at Operable Unit (OU)-1 at the former U.S. Army Base Fort Ord located in Monterey County, California. This work was awarded in December 2003 by the U.S. Army Corps of Engineers (USACE)-Omaha District under Contract Number DACA45-03-D-0029; it is being administered through the USACE-Sacramento District. The overall objectives of the remediation project are:

- Complete the existing OU-1 groundwater extraction and treatment system (GWETS) to extract and treat groundwater exceeding the cleanup concentration levels established in the Record of Decision (ROD);
- Provide hydraulic control and containment of contaminated groundwater; and
- Avoid, mitigate, or minimize environmental impacts in the OU-1 area.

One component of the overall GWETS expansion will be construction of wells to prevent the plume within the Ft. Ord Natural Reserve (FONR) from migrating beyond the Former Fort Ord northwest boundary road. The design of the GWETS expansion will be improved by obtaining better estimates of aquifer hydraulic properties and well yield. Consequently, HGL and the Base Realignment and Closure (BRAC) Cleanup Team (BCT) elected to develop and implement a Hydraulic Control Pilot Project (HCPP) to test a migration control strategy and obtain aquifer data to support subsequent system design.

This HCPP Work Plan (Work Plan) provides a summary of the numerical groundwater model update, model simulations, and alternative testing that was performed to develop the components of the proposed HCPP. It also describes the system components (i.e., wells, pipelines, treatment facility, etc.), and the monitoring network proposed for evaluating system performance. An overview of the planned construction activities, design details for the various project components, and the steps to be taken in order to implement the HCPP also are described.

Design drawings and specifications for the HCPP components are included in Appendix A. The objectives of the HCPP are:

- Better define aquifer hydraulic conductivity where the plume crosses the northwest boundary road of the former Fort Ord;
- Define the parameters of a hydraulic barrier that will prevent further migration of contaminated groundwater across the northwest boundary road of the former Fort Ord; and
- Obtain data that can be used to estimate the rate of groundwater plume migration and the extent of groundwater capture for a given pumping well.

The Pilot Project will be implemented along the northwest boundary road of the Fort Ord Natural Reserve (FONR), adjacent to the physical boundary of the Former Fort Ord (Figure 1.3). Extraction wells will be installed such that the combined capture zones of the individual wells

encompass more than the full width and thickness of the trichloroethene (TCE) plume. Extracted groundwater will be pumped through granulated activated carbon (GAC) tanks arranged in sequence to remove volatile organic compounds (VOCs). The treated water will be returned to the A-Aquifer via infiltration trenches installed in the grassland area northeast of the OU-1 plume (Figure 1.3). The GAC treatment process has successfully removed VOCs from OU-1 groundwater at the existing treatment facility since groundwater remediation commenced in 1988.

The overall OU-1 remediation project is still underway and the Pilot Project is a precursor to additional remedial design and construction efforts to address the remainder of the plume upgradient from the northwest boundary road where the HCPP is focused (Figure 1.2). To maximize the benefit of this HCPP and, therefore, the effectiveness of the overall remediation effort, the Pilot Project treatment facility is designed with consideration for future expansion to treat the upgradient plume. The design basis for the pilot project treatment system thus provides capacity in excess of that needed for only the Pilot Project wells. The system components of the Pilot Project are:

- Four extraction wells (design rate combined pumping of 80 gallons per minute [gpm])
- Granular activated carbon (GAC) unit with 100 gpm treatment capacity (facility expandable to 200 gpm)
- Infiltration trenches for recharge of treated water (250 gpm capacity for redundancy)

The location for the treatment facility (Figure 5.1) was selected to be compatible with future construction of new extraction wells and incorporation of existing wells in the FONR. Its location in the grassland area to the northeast of the principal habitat area for protected plant species (Monterey Spineflower and Sand gilia) and also near the northwest edge of the FONR is expected to minimize environmental impacts. The treatment plant site is near existing Pacific Gas & Electric (PG&E) power lines and outside the PG&E easement. Access to the area is from the northeast, allowing traffic to travel around, rather than through, the FONR. The treatment location is near the Pilot Project wells and easily accessible to future new wells within the main body of the TCE plume in the FONR.

The treatment process will use GAC to remove VOCs from groundwater. Extracted groundwater will be pumped through a bag filter, then through two GAC tanks in series. The treated water (effluent) from the downstream GAC tank will be gravity fed to the primary infiltration trench. The secondary infiltration trench will provide backup capacity.

The effectiveness of the treatment system will be evaluated through performance monitoring. Groundwater samples will be collected from 14 wells on a quarterly basis: 6 existing wells and 8 new wells that will be installed to augment the monitoring network. System performance monitoring will be conducted to provide data that will be used to:

- Evaluate the effectiveness of the Pilot Project hydraulic control wells in preventing the plume within the FONR from migrating beyond the northwest boundary road; and
- Verify that the treated groundwater effluent is meeting the cleanup targets established in the OU-1 ROD.

The proposed schedule and the overall strategy for completing the construction phase of the Pilot Project is summarized as follows:

- January 2006: Submit Draft Final HCPP Work Plan including 90 percent design for pipelines and well heads and incorporating BCT comments received on the Draft HCPP Work Plan.
- Early February 2006: Begin well installation after BCT review of full 90 percent design.
- February 2006: Submit Draft Final Work Plan
- April 2006: Submit Final Work Plan with 100 percent design.
- April - June 2006: Construct HCPP system.
- Second half of June 2006: Conduct system shakedown and begin full operation.